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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/920,958	08/03/2001	Julian Frank Andrew Magarey	169.2154	5877

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EXAMINER	
HUNG, YUBIN	

ART UNIT	PAPER NUMBER
2625	

DATE MAILED: 07/29/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/920,958	MAGAREY ET AL.	
	Examiner	Art Unit	
	Yubin Hung	2625	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) 1-45 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☒ Claim(s) 5-12, 14-18,23-30, 32-36 and 41-45 is/are allowed.

6)☒ Claim(s) 1-4,13,19-22,31 and 37-40 is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on 03 August 2001 is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date 3, 5.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 1, 19, 37 are rejected under 35 U.S.C. 102(b) as being anticipated by IBM (Technical Disclosure Bulletin, Dec. 1991, U.S., Vol. 34, No. 7B, pp. 264-265).

Regarding claim 1, and similarly claims 19 and 37, IBM discloses a segmentation process

- using a region-merging process
  [Disclosure Text: lines 10-11]
- (characterized by) using covariance data and a plurality of vector components of each said pixel to evaluate a merging criterion for regions of said image
  [Disclosure Text: lines 2 (plurality of components) and 7-10 (covariance)]

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. Claims 2, 3, 20, 21, 38, 39 are rejected under 35 U.S.C. 103(a) as being unpatentable over IBM (Technical Disclosure Bulletin, Dec. 1991, U.S., Vol. 34, No. 7B, pp. 264-265) as applied to claims 1, 19, 37 above, and further in view of Bouchard et al. (US 5,845,013).

5. Regarding claim 2, and similarly claims 20 and 38, IBM discloses all limitations of its parent, claim 1.

IBM does not expressly disclose

- said plurality of vector components comprise at least two of colour, range and motion

However, Bouchard teaches/suggests using color and motion data to segment an image into homogeneous regions. [Col. 1, lines 21-24.]

IBM and Bouchard are combinable because they both have aspects that are from the same field of endeavor of image segmentation.

At the time of the invention, it would have been obvious to one of ordinary skill to modify IBM with the teachings of Bouchard by using color and motion as part of the multi-band image data. The suggestion/motivation for doing so would have been to be more

reliably segment image frames from a color video sequence that contain moving objects.

Therefore, it would have been obvious to combine Bouchard with IBM to obtain the invention specified in claim 2.

6. Regarding claim 3, and similarly claims 21 and 39, Bouchard discloses

- said colour vector component comprises at least one colour channel of a colour space in which said image can be reproduced
  [Col. 1, lines 21-24. Note that it is well known that a color vector component of an image comprises at least one color channel from a color space (e.g., RGB) and the image can surely be reproduced in that color space]

***

7. Claims 4, 22, 40 are rejected under 35 U.S.C. 103(a) as being unpatentable over IBM (Technical Disclosure Bulletin, Dec. 1991, U.S., Vol. 34, No. 7B, pp. 264-265) and Shen et al. ("Segmentation of 2D and 3D Images through a Hierarchical Clustering Based on Region Modeling," *Proc. Int'l Conf. On Image Processing, Vol. 3*, pp 50-53, 26-29 Oct. 1997).

8. Regarding claim 4, and similarly claims 22 and 40, IBM discloses

- each said pixel being described by a vector having components each relating to a different measured image characteristic
  [Disclosure: line 2]

said method comprising the steps of

- receiving, for each said pixel, a plurality of said vector components and a corresponding error covariance representation of said pixel
  [Disclosure: lines 1-10]

IBM fails to expressly disclose

- for each said pixel, fitting each said component and the corresponding covariance representation to a predetermined linear model to obtain a set of model parameters and corresponding confidence representations
- statistically analyzing the sets of model parameters and corresponding confidence representations to derive a segmentation of said image that minimizes a predetermined cost function

However, Shen teaches/suggests linearly fitting the gray level (a kind of description) of pixels in a region [P. 50, Eq. 2] (the extension to all components of a multi-dimensional description of a pixel is obvious), determining a confidence representation [P. 50, Eq. 3], deriving a segmentation by statistical analysis [PP. 51-52: Sect. 4], and minimizing a cost function in selecting the pair of region to merge during segmentation [P. 51, Eq. 4].

IBM and Shen are combinable because they are from the same field of endeavor of image segmentation.

At the time of the invention, it would have been obvious to one of ordinary skill to modify IBM with the teachings of Shen by linearly fitting the components and covariance value (i.e. the multi-dimensional description) of each pixel, determining a confidence representation, deriving a segmentation by statistical analysis, and minimizing a cost function in selecting the pair of region to merge during segmentation. The suggestion/motivation for doing so would have been that a linear model is a better approximation to a region (than, say, average, which is commonly used) and yet can be

efficiently computed. In addition, prior knowledge about the images being processed can also be utilized to obtain a better result when statistical analysis is employed.

Therefore, it would have been obvious to combine Shen with IBM to obtain the invention specified in claim 4.

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9. Claims 13, 31 are rejected under 35 U.S.C. 103(a) as being unpatentable over IBM (Technical Disclosure Bulletin, Dec. 1991, U.S., Vol. 34, No. 7B, pp. 264-265) and Shen et al. ("Segmentation of 2D and 3D Images through a Hierarchical Clustering Based on Region Modeling," *Proc. Int'l Conf. On Image Processing, Vol. 3*, pp 50-53, 26-29 Oct. 1997) as applied to claims 4, 22, 40 above, and further in view of Bouchard et al. (US 5,845,013).

10. Regarding claim 13, and similarly claim 31, the combined invention of IBM and Shen discloses all limitations of its parent, claim 4.

The combined invention of IBM and Shen does not expressly disclose

- said plurality of vector components comprise at least two of colour, range and motion

However, Bouchard teaches/suggests using color and motion data to segment an image into homogeneous regions. [Col. 1, lines 21-24.]

The combined invention of IBM and Shen and Bouchard are combinable because they both have aspects that are from the same field of endeavor of image segmentation.

At the time of the invention, it would have been obvious to one of ordinary skill to modify the combined invention of IBM and Shen with the teachings of Bouchard by using color and motion as part of the multi-band image data. The suggestion/motivation for doing so would have been to be more reliably segment image frames from a color video sequence that contain moving objects.

Therefore, it would have been obvious to combine Bouchard with the combined invention of IBM and Shen to obtain the invention specified in claim 13.

Allowable Subject Matter

11. Claims 5-12, 14-18, 23-30, 32-36, 41- 45 are allowed.

12. The following is a statement of reasons for the indication of allowable subject matter:

13. Regarding claim 5, and similarly claims 23 and 41, the prior art of record fails to teach or suggest, alone or in combination, a method for segmenting an image, comprising, along with other limitations:

- (cb) merging said regions in a statistical order using said sets of model parameters and confidence representations to obtain a null segmentation of said image
- (cc) analyzing a curve formed using said model parameters and corresponding confidence representations to determine an optimal halting criterion at which to cease the merging of said regions; and
- (cd) processing said merging of said initial regions to halt when said optimal merging criterion is reached

Closest art of record Koepfler et al. ("A Multiscale Algorithm for Image Segmentation by Variational Method," *SIAM J. Numerical Analysis, Vol. 31, No. 1*, pp 282-299, February 1994) discloses a merging-based segmentation method that halts when a null segmentation is obtained (i.e., there is only one region left) or a parameter list is exhausted [P. 292, lines 2-3, step (iii) of the algorithm]. While an *implicit* curve is formed using the best merging scores of step (ii) and the cost associated with the last merging step can be considered the optimal halting criterion, the implicit curve *per se* has not been analyzed to obtain this criterion.

14. Regarding claim 15, and similarly claims 33 and 42, the prior art of record fails to teach or suggest, alone or in combination, a method for unsupervised selection of a stopping point for a region-merging segmentation process, comprising, along with other limitations:

- (a) analyzing a graph of merging cost values to identify departures from substantial monotonicity of said graph
- (b) selecting said stopping point to be a merging cost value corresponding to a return to monotonicity of said graph, said selected stopping point being associated with one of a limited plurality of final said departures in said region merging process

Closest art of record Koepfler et al. ("A Multiscale Algorithm for Image Segmentation by Variational Method," *SIAM J. Numerical Analysis, Vol. 31, No. 1*, pp 282-299, February 1994) discloses a merging-based segmentation method that uses a piece-wise monotonous (in the sense that it is monotonous for each value of the λ parameter) cost function. For each λ value, merging occurs only if the cost function is minimized (with respect to all pairs of regions whose merging can decrease the cost). [P. 292: Algorithm.] A departure from monotonicity can occur when a new λ value is first used (i.e., when step (ii) of the algorithm is just repeated with a new λ value) and the value is larger than that of the previous iteration (see the equation for E(u, K) at the top of section 4.1 on P. 292). However, while an *implicit* curve is formed using the best merging scores of step (ii) and the cost associated with the last merging step can be considered the optimal halting criterion, the implicit curve *per se* has not been analyzed to identify departures, let alone to select the stopping point in the recited manner.

Contact Information

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Yubin Hung whose telephone number is (703) 305-1896. The examiner can normally be reached on 7:30 - 4:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Bhavesh Mehta can be reached on (703) 308-5246. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Yubin Hung
Patent Examiner
July 20, 2004

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